

iProject Networking 101

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The iProject communicates over the Internet using “**SSL sockets**,” or more precisely “**TCP/IP sockets with SSL encryption**.” In the IT dialect, these succinct phrases identify a very specific method of transporting digital data from a sender to a receiver. We shall briefly describe this method, and some of its pitfalls as they relate to the iProject.

Internet Communication Basics

- **TCP/IP Socket**
 - “Transmission Control Protocol over Internet Protocol”
 - Underlying mechanism of communication on the Internet (and most networks)
 - Usually just called a **Socket** (although there are other kinds of sockets)
- **SSL**
 - “Secure Socket Layer”
 - Standard method of encrypting data streams
 - Not a protocol itself, though often confused with HTTP/S (secure Web protocol)
- **SSL Socket** is a (TCP/IP) Socket in which data is encrypted using SSL
- *Figure 1* illustrates the process of data transmission over the Internet

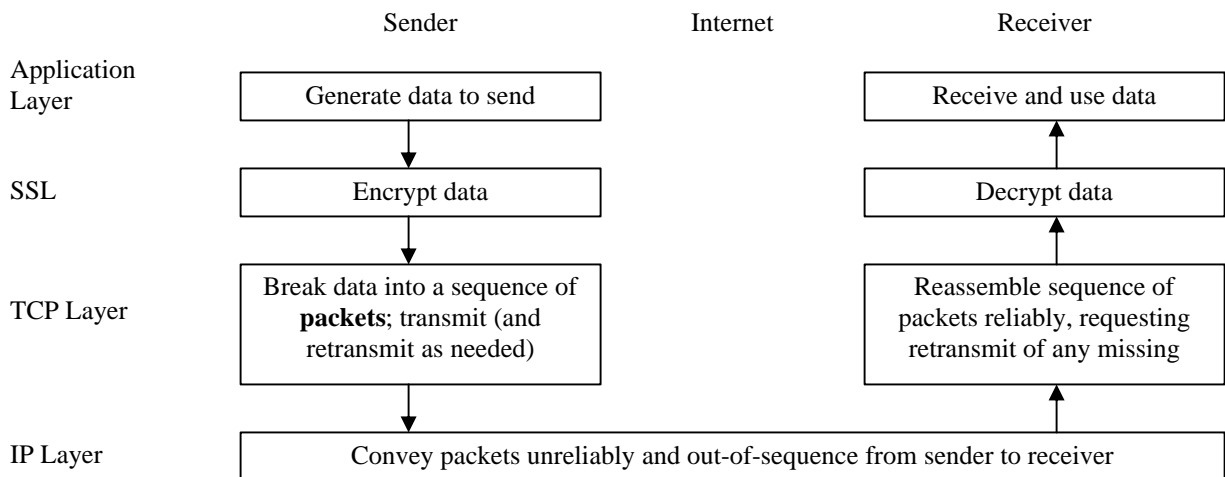


Figure 1: The layers of Internet communication

Socket Basics

- A socket is a “**virtual wire**” carrying data between programs on two computers
- Specified by two ends: “source” and “destination”
 - Each end represents one of the communicating programs:
 - **IP Address** specifies the computer on which the program is running
 - **Port Number** identifies the program or specific program request
 - Data travels both ways over a socket
 - “Source” is the program that created (opened) the socket, usually a client
 - “Destination” is usually a server
- Socket’s “**address**” and “**port**” refer to the destination (server) address and port, because the source (client) address and port are typically dynamically assigned
- **Figure 2** depicts a socket from 12.44.214.88 : 3126 to 198.173.158.133 : 443
 - This socket’s **address** would be 198.173.158.133
 - Its **port** would be 443
- For the iProject, the source is the iProject client; the destination is the iProject server.

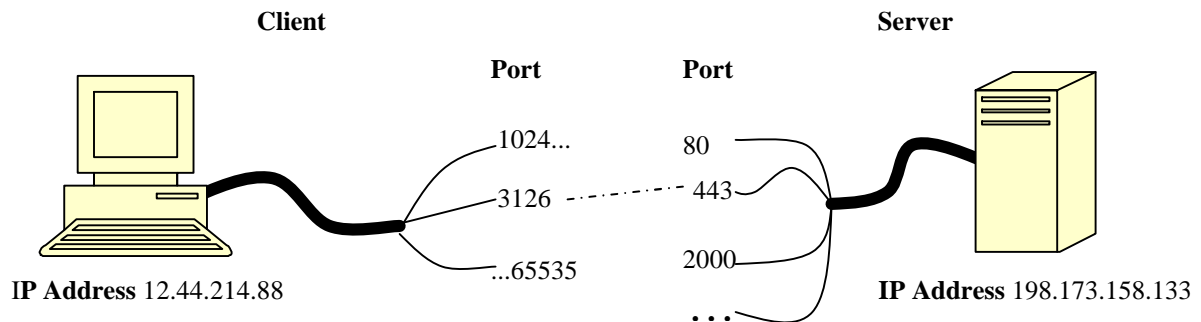


Figure 2: Anatomy of a socket

More On Port Numbers

- Port numbers are integers in the range 1 to 65535
- Port numbers on the client end are dynamically assigned when sockets are opened
- Port numbers on the server end are statically assigned to specific programs
 - Servers are said to “listen” on their assigned ports, because a server waits for a client to open a connection
 - Numbers below 1024 are called “**System ports**”
 - Usually assigned to well-known programs such as Web or email servers
 - Numbers 1024 and above are called “**User ports**”
 - Usually used by more specialized programs like the iProject
 - The iProject server can listen on a configurable set of ports
 - Helps accommodate the varied security policies and firewall configurations at different companies
 - Client only needs to be able to connect to **one** port on the iProject server
 - **Figure 3** enumerates some common server-side port numbers, including the iProject server’s default ports

Port Number	Applications	Discussion
20	FTP Data iProject	FTP data transmission The iProject server listens on port 20 because it is already open in some firewalls
21	FTP Command	FTP command transmission The iProject server does not listen on port 21 because it is frequently probed by attackers
23	Telnet	Telnet traffic
25	SMTP	Sending email
53	DNS	Domain name resolution
80	HTTP (Web) iProject	Standard Web traffic The iProject server listens on port 80 (despite frequent probing) because it is already open in most firewalls
110	POP	Receiving email
443	HTTP/S (Secure Web) iProject	Secure Web traffic The iProject server listens on port 443 because it is already open in many firewalls
2000 2001	iProject	The iProject server listens on ports 2000 and 2001 as its standard “User ports” because of their similarity to the FTP ports 20 and 21 (some of the iProject’s functionality is similar to FTP)

Figure 3: Common server-side ports and applications

Internet Communication In Practice

Finally, **Figure 4** gives a hardware-oriented overview of how iProject data travels over the Internet. Almost all connection problems are caused by one of the firewalls, usually the corporate firewall.

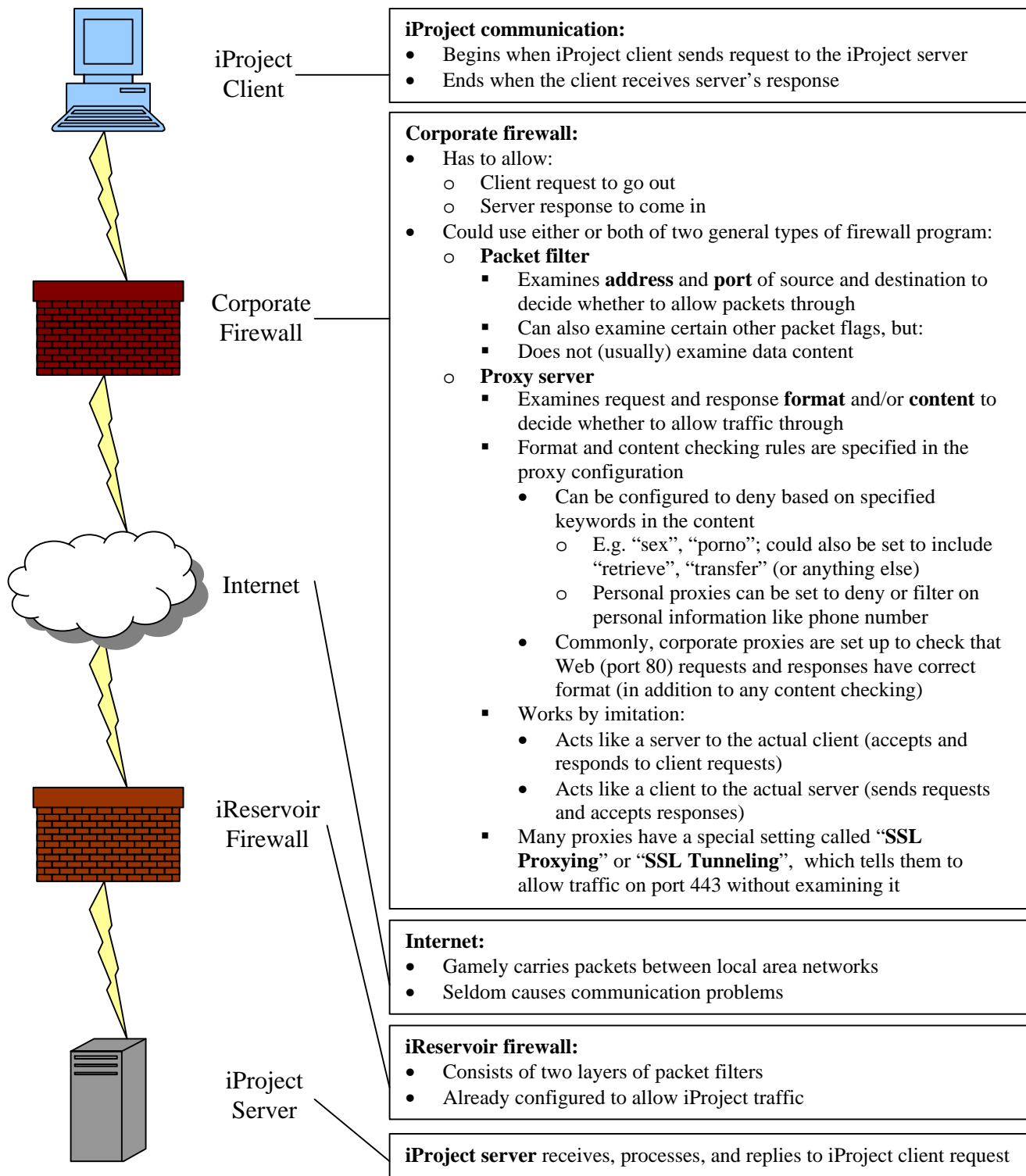


Figure 4: Important players in Internet communication